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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,215	04/16/2004	Yim Bun Patrick Kwan	081468-0309201	7263

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EXAMINER	
STOCK JR, GORDON J	
ART UNIT	PAPER NUMBER
2877	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/825,215	KWAN, YIM BUN PATRICK	
	Examiner	Art Unit	
	Gordon J. Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12,14,15 and 20-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,14,15,20,23,24* is/are rejected.

7)☒ Claim(s) *21,22 and 25-33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 09/928,462.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20040416;20060309*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I in the reply filed on November 2, 2006 is acknowledged.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09/928462, filed on August 22, 2001.

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted on April 16, 2004 and March 9, 2006 are being considered by the examiner.

Drawings and Specification

4. The drawings and specification are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: RF of Fig. 1. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required

corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. **Claims 1-12, 14, and 15** are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over **claims 1-3, 5, 6, 1, 11-16, 18, 19 respectively** of **U.S. Patent No. 6,819,425 (Kwan)**. Although the conflicting claims are not identical, they are not patentably distinct from each other because **claims 1-12 and claims 1-3, 5, 6, 1, 11-16 respectively of Kwan '425** are both lithographic projection apparatus comprising:

support structure, projection system, displacement measuring system with or without a reference frame. Though **claims 1 and 5** of **Kwan '425** have the additional limitations: a radiation system (**claims 1 and 5**) and 'wherein ... said grating is positioned so as to be ... substrate held by said substrate table (**claim 1**), **claims 1 and 5** of **Kwan '425** anticipate the limitations of **claims 1, 4, and 6. Claims 2-3, 6, 11-16** of **Kwan '425** anticipate **claims 2-3, 5, 7-12** respectively. Also **claims 14 and 15** and **claims 18 and 19** of **Kwan '425** are both device manufacturing methods; wherein, **claims 18 and 19** of **Kwan '425** anticipate the limitations of **claims 14 and 15.**

7. **Claims 23-24** are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over **claims 25 and 5** of **U.S. Patent No. 6,819,425 (Kwan)** in view of **"Precision wafer stepper utilizing a two-dimensional optical encoder" by Dey—cited by applicant.** As for **claims 23-24** see above with **claim 4** of application. In addition, as for **claim 23, Kwan '425's claim 25** discloses everything as above. However, he is silent concerning the encoder being optical. However, Dey teaches that encoder systems for stage systems are optical (Fig. 3). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the encoder was optical in order to detect the signal from the optical grid plate. As for **claim 24, Kwan '425's claim 5** anticipates everything as above; however, he is silent concerning a two-dimensional grating. He suggests it for **Kwan '425's claim 5** teaches 'at least two degrees of freedom (col. 13, lines 53-54). And Dey teaches that grid plates are two-dimensional (Figs. 1 and 2). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the grid grating was two-dimensional in order to measure displacement in two degrees of freedom, the x and y direction.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. **Claims 14 and 20** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 14 and 20 are directed to a judicial exception; as such, pursuant to the Interim Guidelines on Patent Eligible Subject Matter (MPEP 2106), the claims must have either physical transformation and/or a useful, concrete and tangible result. The claims fail to include transformation from one physical state to another. Although, the claims appear useful and concrete, there does not appear to be a tangible result claimed. Merely 'measuring displacements ..using at least one grating and at least one sensor' (the measuring step is an abstract idea without a tangible result of **claim 14**) and 'measuring a displacement'(the measuring step is an abstract idea without a tangible result of **claim 20**) would not appear to be sufficient to constitute a tangible result, since the outcome of the measuring step has not been used in a disclosed practical application nor made available in such a manner that its usefulness in a disclosed practical application can be realized. As such, the subject matter of the claims is not patent eligible.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. **Claims 6 and 9** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regards to **claims 6 and 9**, the phrase 'wherein the or each grid grating' of lines 1-2 is indefinite, for it is unclear what other component may be positioned so as to be substantially coplanar or may include a reference mark. Examiner has interpreted the 'wherein the or each grid grating' as 'wherein each grid grating.'

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. **Claims 1, 3, 8, 10, 11, 12, 14, 15, 20** rejected under 35 U.S.C. 103(a) as being unpatentable over **Nishi et al. (6,341,007)—cited by applicant** in view of **"Precision wafer stepper utilizing a two-dimensional optical encoder" by Dey—cited by applicant**

As for **claim 1**, Nishi in an exposure apparatus discloses the following: a support structure configured to support a patterning device, the patterning device serving to pattern a beam of radiation according to a desired pattern (Fig. 1: R, RST); a substrate table configured to hold a substrate (Fig. 1: WS1, W1); a projection system configured to project the patterned beam onto a target portion of the substrate (Fig. 1: PL); a displacement measuring system configured to measure the position of a moveable object comprising said substrate table in at least two degrees of freedom comprising at least one grid grating formed on said moveable object and at least one

sensor head configured to measure displacements of said grid grating in two degrees of freedom (col. 97, lines 55-63). He is silent concerning the grid being mounted. However, Dey in a precision wafer stepper teaches the grid being mounted to the substrate stage (Dey: Fig. 1: grid under stage). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the grid grating mounted to the substrate stage in order to have it firmly supported to move in unison with the stage.

As for **claim 3**, Nishi in view of Dey discloses everything as above (see **claim 1**). As for having the grid grating incorporated directly into the main body of said moveable object, Nishi does not explicitly state this, but he implies it because the grid is formed on the stage (col. 97, lines 44-50). In addition, Dey discloses incorporating the grid plate into the stage system comprising a granite support structure (Fig. 1: stage with grid with granite). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the grid grating incorporated into the main body of the substrate table to have a more compact system.

As for **claim 8**, Nishi in view of Dey discloses everything as above (see **claim 1**). In addition, Nishi discloses one or more optical sensors configured to measure position of said moveable object in degrees of freedom not measured by said grid grating and sensor head, z direction (col. 50, lines 25-52).

As for **claim 10**, Nishi in view of Dey discloses everything as above (see **claim 1**). In addition, Nishi discloses an optical encoder (col. 97, lines 59-61).

As for **claim 11**, Nishi in view of Dey discloses everything as above (see **claim 1**). Nishi is silent concerning an interpolator. However, Dey in a precision wafer stepper suggests interpolation by reference to linearity with a triangular wave form wherein best linearity is

achieved by having a signal and bias amplitude equal (page 30: second paragraph of Optical Analyzer). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have an interpolator in order to convert the signal to a best linearity fit for displacement determination in at least one degree of freedom.

As for **claim 12**, Nishi in view of Dey discloses everything as above (see **claim 1**). In addition, Nishi discloses the support structure comprises a mask table, reticle stage, for holding a mask, a reticle (Fig. 1: RST, R).

As for **claim 14**, Nishi discloses projecting a patterned beam of radiation onto a target portion of radiation sensitive material on a substrate (col. 34, lines 19-22; Fig. 1: R, PL, W1); measuring displacements of a substrate table in at least two degrees of freedom using at least one grid grating formed thereon and at least one sensor head (col. 34, lines 23-30 and col. 97, lines 55-63). Nishi is silent concerning the grid being mounted. However, Dey in a precision wafer stepper teaches the grid being mounted to the substrate stage (Dey: Fig. 1: grid under stage). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the grid grating mounted to the substrate stage in order to have it firmly supported to move in unison with the stage.

As for **claim 15**, Nishi in view of Dey discloses everything as above (see **claim 14**). In addition, Nishi discloses a device manufactured, a wafer substrate (col. 34, lines 19-22; Fig. 1: W1 and W2).

As for **claim 20**, Nishi in view of Dey discloses everything as above (see **claim 14**). In addition, Nishi discloses measuring displacement in a z-direction perpendicular to a plane substantially parallel to a surface of the target portion (Fig. 1: x, y, z coordinate system in lower

right corner demonstrating wafer in x-y plane and z perpendicular to wafer surface; col. 50, lines 25-52).

14. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Nishi et al. (6,341,007)—cited by applicant** in view of **"Precision wafer stepper utilizing a two-dimensional optical encoder" by Dey—cited by applicant** further in view of **Resor, III et al. (4,769,680).**

As for **claim 7**, Nishi in view of Dey discloses everything as above (see **claim 1**). In addition, Nishi discloses a memory for displacement information (col. 51, lines 57-63). He is silent concerning correction information representing differences between grid grating and an ideal grating and a data processing unit configured to correct measurements output by said sensor head. However, Resor in an alignment system teaches a calibration operation with an ideal grid (col. 20, lines 23-41). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to use an ideal grating in a calibration process in order to correct measurements from the displacement for proper positioning.

Allowable Subject Matter

15. **Claims 21, 22, 25-33** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 2 and 5 would be allowable if the double patenting rejection is overcome and if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 4, 23, and 24 would be allowable if the double patenting rejection is overcome.

Claims 6 and 9 would be allowable if the double patenting rejection and 112 second paragraph is overcome and if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to **claim 2**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a lithographic projection apparatus comprising two grid gratings and two sensor heads, in combination with the rest of the limitations of **claim 2.**

As to **claim 4**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a lithographic projection apparatus one grid grating mounted on a reference frame and at least one sensor head mounted on said moveable object, in combination with the rest of the limitations of **claims 4, 21-33.**

As to **claim 5**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a lithographic projection apparatus a grid grating has a length in said first direction greater than or equal to the range of motion of said moveable object in said first direction, in combination with the rest of the limitations of **claim 5.**

As to **claim 6**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a lithographic projection apparatus said grid grating is positioned so as to be substantially coplanar with the functional surface of said patterning device or substrate, in combination with the rest of the limitations of **claim 6.**

As to **claim 9**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a lithographic projection apparatus grid grating includes a reference mark, in combination with the rest of the limitations of **claim 9.**

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: U.S. Patent 5,142,146 to Morokuma

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: **(571) 273-8300**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs
January 20, 2007

Gregory J. Toatley, Jr.
Supervisory Patent Examiner
Art Unit 2877